

We Claim:

5 1. Protective device for a repeatedly rechargeable electrochemical battery with a battery housing, comprising a hermetically sealed protective housing, a detector element, and at least one switching element which is activatable by the detector element and which prevents at least one of recharging and discharging of the battery when the battery is in an impermissible operating state; wherein the hermetically sealed protective housing has a receiving space for the battery housing and is part of an implantable device; and wherein the detector element is constructed and arranged to deflect, at least in part, in response to occurrence of an impermissible operating state of the battery.

10 2. Protective device as claimed in claim 1, wherein said at least one switching element is a break contact which electrically interrupts a recharging circuit powered by a charging device when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

15 3. Protective device as claimed in claim 1, wherein said at least one switching element is a break contact which electrically interrupts a consumer circuit which is electrically connected to the battery when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

20 4. Protective device as claimed in claim 1, wherein said at least one switching element is a make contact which electrically short circuits a recharging circuit powered by a charging device when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

25 5. Protective device as claimed claim 1, wherein said at least one switching element is a make contact which electrically short circuits the battery when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

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5 6. Protective device as claimed in claim 1, wherein said at least one switching element irreversibly interrupts a circuit when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

7. Protective device as claimed in claim 1, wherein said at least one switching element reversibly interrupts a circuit when said at least one switching element is activated by said deflection of at least part of the detector element in response to said occurrence of an impermissible operating state of the battery.

10 8. Protective device as claimed in claim 1, wherein at least one overcurrent fuse is provided for limiting a current in at least one of a recharging and consumer circuit of the battery.

9. Protective device as claimed in claim 1, wherein at least one overcurrent fuse is provided for interrupting a current in at least one of a recharging and consumer circuit of the battery.

15 10. Protective device as claimed in claim 1, wherein said at least one switching element is positioned close enough to the detector element to be mechanically actuated by means of the deflection of at least part of the detector element.

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20 11. Protective device as claimed in claim 1, wherein said at least one switching element coupled to a means of evaluation electronics having means for determining the occurrence of said deflection of at least part of the detector element and for causing activation of said at least one switching element in response to said determination.

12. Protective device as claimed in claim 11, wherein said means for determining comprises an electrical extensometer.

13. Protective device as claimed in claim 12, wherein the electrical extensometer is a strain gauge.

14. Protective device as claimed in claim 12, wherein the electrical extensometer is a piezoelectric converter.

15. Protective device as claimed in claim 1, wherein the detector element is part of the protective housing.

5 16. Protective device as claimed in claim 15, wherein the detector element comprises a deflectable membrane.

17. Protective device as claimed in claim 16, wherein the membrane forms an outer wall of the protective housing.

10 18. Protective device as claimed in claim 16, wherein the membrane forms a partition within the protective housing.

19. Protective device as claimed in claim 15, wherein the detector comprises at least one membrane which is integrated into a side wall of the hermetically sealed protective housing; and where the at least one membrane has a direction of curvature running essentially perpendicular to a smallest dimension of the battery.

15 20. Protective device as claimed in claim 19, wherein said at least one membrane is part of a make contact having a contact pair, said at least one membrane being a means for electrically short circuiting the contact pair of the make contact.

20 21. Protective device as claimed in claim 19, wherein said at least one membrane is part of a break contact having a contact pair, said at least one membrane being a means electrically disengaging the contact pair of the break contact.

22. Protective device as claimed in claim 1, wherein the battery has two terminal contacts which make electrical contact with areas of the protective housing which are electrically insulated relative to one another, the areas of the protective housing which are electrically insulated relative to one another being electrically conductive and being electrically connected to at least one of a

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recharging circuit and a consumer circuit.

23. Protective device as claimed in claim 1, wherein the battery housing has at least one terminal contact which is electrically connected to at least one of a recharging circuit and a consumer circuit via a hermetically sealed feed-through which is electrically insulated with reference to the protective housing.

24. Protective device as claimed in claim 23, wherein the feed-through is at least one-poled and comprises a ceramic substrate; and wherein, for each pole, a metallic contact pin is provided which penetrates the substrate in a hermetically sealed manner.

25. Protective device as claimed in claim 24, wherein hermetic sealing of each contact pin in the ceramic substrate is provided by means of a material connection; and wherein the substrate is hermetically sealed in an outside wall of the protective housing by means of a material connection.

26. Protective device as claimed in claim 24, wherein hermetic sealing of each contact pin in the ceramic substrate is provided by means of a material connection; wherein the substrate is hermetically sealed in an a metallic receiver by means of a material connection; and wherein the metallic receiver is connected to an outside wall of the protective housing by a material connection.

27. Protective device as claimed in claim 1, wherein said impermissible operating state of the battery comprises at least one of an unacceptable expansion in the volume of the battery and an escaping of gas from the battery housing which results in an unacceptable pressure rise within the hermetically sealed protective housing.

28. Protective device as claimed in claim 1, wherein the protective housing is made of a ~~bio-compatible~~ material.

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